

234-485 | 497 | 503 | 515

BTY79 SERIES

## THYRISTORS



Glass-passivated silicon thyristors in metal envelopes, intended for use in power control circuits (e.g. light and motor control) and power switching systems.

The series consists of reverse polarity types (anode to stud) identified by a suffix R: BTY79-400R to 1000R.

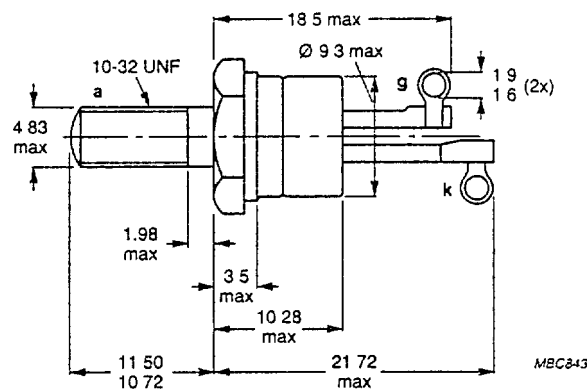
### QUICK REFERENCE DATA

|                                                 | BTY79-400R        | 500R | 600R | 800R | 1000R  |
|-------------------------------------------------|-------------------|------|------|------|--------|
| Repetitive peak voltages $V_{DRM}/V_{RRM}$ max. | 400               | 500  | 600  | 800  | 1000 V |
| Average on-state current                        | $I_{T(AV)}$ max.  |      |      |      | 10 A   |
| R.M.S. on-state current                         | $I_{T(RMS)}$ max. |      |      |      | 16 A   |
| Non-repetitive peak on-state current            | $I_{TSM}$ max.    |      |      |      | 150 A  |

### MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-64: with 10-32 UNF stud ( $\phi$  4,83 mm).



Net mass: 7 g  
 Diameter of clearance hole: max. 5,2 mm  
 Accessories supplied on request:  
 see ACCESSORIES section

Torque on nut: min. 0,9 Nm  
 (9 kg cm)  
 max. 1,7 Nm  
 (17 kg cm)

Supplied with device: 1 nut, 1 lock washer.

Nut dimensions: across the flats: 9,5 mm.



Qualification approved to CECC 50 011-006.

## RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

### Anode to cathode

|                                                            |                        | BTY79-400R | 500R | 600R | 800R | 1000R   |
|------------------------------------------------------------|------------------------|------------|------|------|------|---------|
| Non-repetitive peak off-state voltage<br>( $t \leq 10$ ms) | $V_{DSM}^{**}$ max.    | 500        | 1100 | 1100 | 1100 | 1100 V  |
| Non-repetitive peak reverse voltage<br>( $t \leq 5$ ms)    | $V_{RSM}$ max.         | 500        | 600  | 720  | 960  | 1100 V  |
| Repetitive peak voltages                                   | $V_{DRM}/V_{RRM}$ max. | 400        | 500  | 600  | 800  | 1000 V  |
| Crest working voltages                                     | $V_{DWM}/V_{RWM}$ max. | 400        | 500  | 600  | 800  | 1000 V* |

Average on-state current (averaged over any 20 ms period) up to  $T_{mb} = 85$  °C

$I_T(AV)$  max. 10 A

R.M.S. on-state current

$I_T(RMS)$  max. 16 A

Repetitive peak on-state current

$I_{TRM}$  max. 75 A

Non-repetitive peak on-state current;  $t = 10$  ms;  
half sine-wave;  $T_j = 125$  °C prior to surge;  
with reapplied  $V_{RWMmax}$

$I_{TSM}$  max. 150 A

$I^2 t$  for fusing ( $t = 10$  ms)

$I^2 t$  max. 112 A<sup>2</sup>s

Rate of rise of on-state current after triggering with  
 $I_G = 150$  mA to  $I_T = 30$  A;  $dI_G/dt = 0,25$  A/ $\mu$ s

$dI_T/dt$  max. 50 A/ $\mu$ s

### Gate to cathode

Average power dissipation (averaged over any 20 ms period)

$P_G(AV)$  max. 0,5 W

Peak power dissipation

$P_{GM}$  max. 5 W

### Temperatures

Storage temperature

$T_{stg}$  -55 to +125 °C

Junction temperature

$T_j$  max. 125 °C

### THERMAL RESISTANCE

From junction to mounting base

$R_{th j-mb}$  = 1,8 °C/W

From mounting base to heatsink  
with heatsink compound

$R_{th mb-h}$  = 0,5 °C/W

From junction to ambient in free air

$R_{th j-a}$  = 45 °C/W

Transient thermal impedance ( $t = 1$  ms)

$Z_{th j-mb}$  = 0,1 °C/W

\* To ensure thermal stability:  $R_{th j-a} < 4$  °C/W (d.c. blocking) or  $< 8$  °C/W (a.c.). For smaller heat-sinks  $T_{j max}$  should be derated. For a.c. see Fig. 3.

\*\* Although not recommended, higher off-state voltages may be applied without damage, but the thyristor may switch into the on-state. The rate of rise of on-state current should not exceed 100 A/ $\mu$ s.

## CHARACTERISTICS

## Anode to cathode

On-state voltage (measured under pulse conditions)

$I_T = 20 \text{ A}; T_j = 25^\circ\text{C}$

$V_T < 2 \text{ V}$

Rate of rise of off-state voltage that will not trigger any device; exponential method;

$V_D = 2/3 V_{DRMmax}; T_j = 125^\circ\text{C}$

$dV_D/dt < 200 \text{ V}/\mu\text{s}$

Reverse current

$V_R = V_{RWMmax}; T_j = 125^\circ\text{C}$

$I_R < 3 \text{ mA}$

Off-state current

$V_D = V_{DWMmax}; T_j = 125^\circ\text{C}$

$I_D < 3 \text{ mA}$

Latching current;  $T_j = 25^\circ\text{C}$ 

$I_L < 150 \text{ mA}$

Holding current;  $T_j = 25^\circ\text{C}$ 

$I_H < 75 \text{ mA}$

## Gate to cathode

Voltage that will trigger all devices

$V_D = 6 \text{ V}; T_j = 25^\circ\text{C}$

$V_{GT} > 1.5 \text{ V}$

Voltage that will not trigger any device

$V_D = V_{DRMmax}; T_j = 125^\circ\text{C}$

$V_{GD} < 200 \text{ mV}$

Current that will trigger all devices

$V_D = 6 \text{ V}; T_j = 25^\circ\text{C}$

$I_{GT} > 30 \text{ mA}$

On request (see Ordering Note)

$I_{GT} > 20 \text{ mA}$

## Switching characteristics

Gate-controlled turn-on time ( $t_{gt} = t_d + t_r$ ) whenswitched from  $V_D = V_{DRMmax}$  to  $I_T = 40 \text{ A}$ ;

$I_{GT} = 100 \text{ mA}; dI_G/dt = 5 \text{ A}/\mu\text{s}; T_j = 25^\circ\text{C}$

$t_{gt} \text{ typ. } 2 \mu\text{s}$

Circuit-commutated turn-off time when switched

from  $I_T = 40 \text{ A}$  to  $V_R > 50 \text{ V}$  with

$-dI_T/dt = 10 \text{ A}/\mu\text{s}; dV_D/dt = 50 \text{ V}/\mu\text{s}; T_j = 115^\circ\text{C}$

$t_q \text{ typ. } 35 \mu\text{s}$

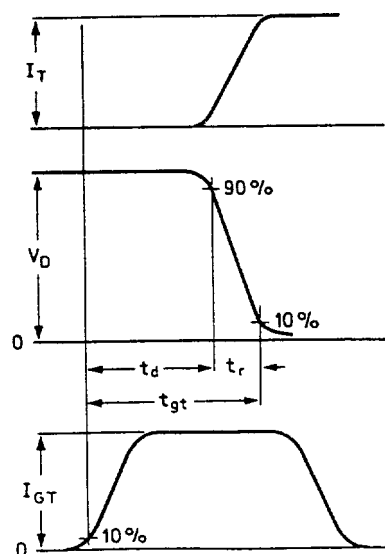


Fig.2a Gate-controlled turn-on time definition.

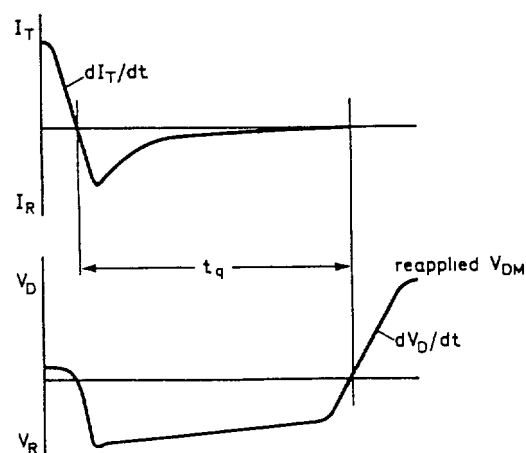


Fig.2b Circuit-commutated turn-off time definition.

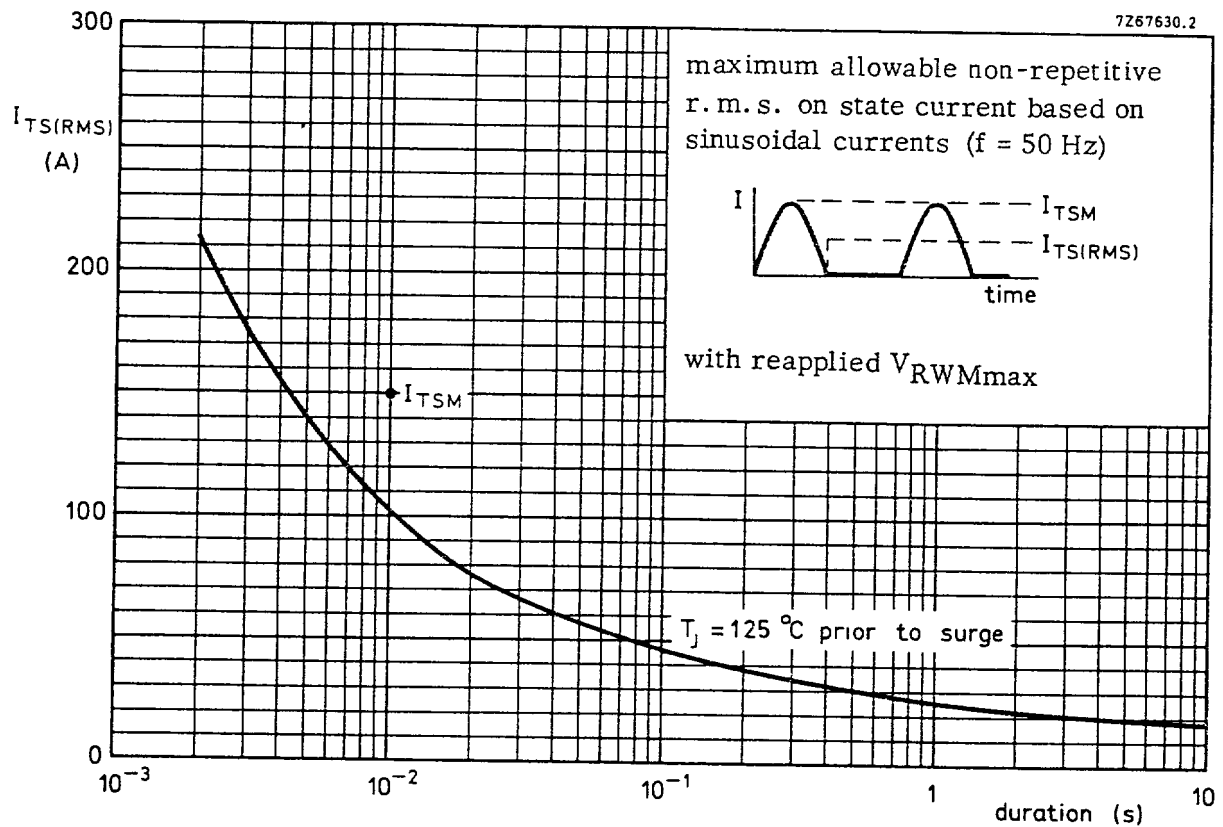


Fig. 4.

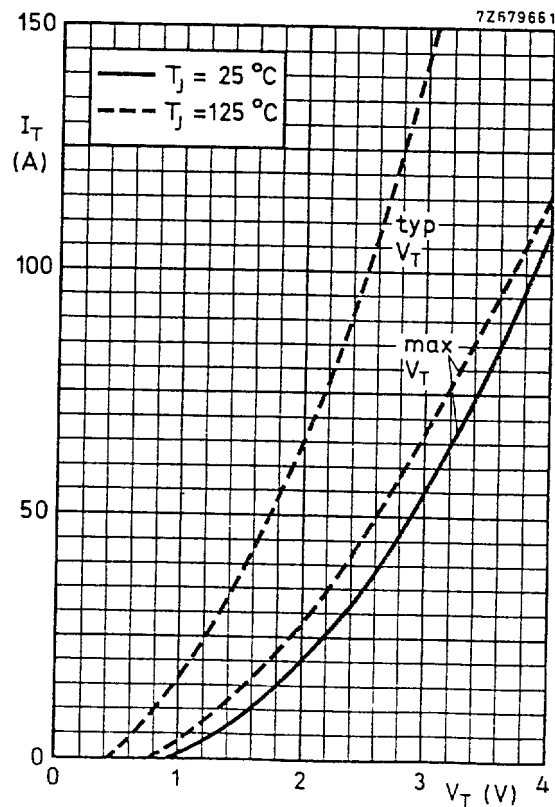


Fig. 5.

## OPERATING NOTE

The terminals should neither be bent nor twisted; they should be soldered into the circuit so that there is no strain on them.

During soldering the heat conduction to the junction should be kept to a minimum.

## ORDERING NOTE

Types with low gate trigger current,  $I_{GT} > 20$  mA, are available on request. Add suffix A to the type number when ordering: e.g. BTY79A-400R.

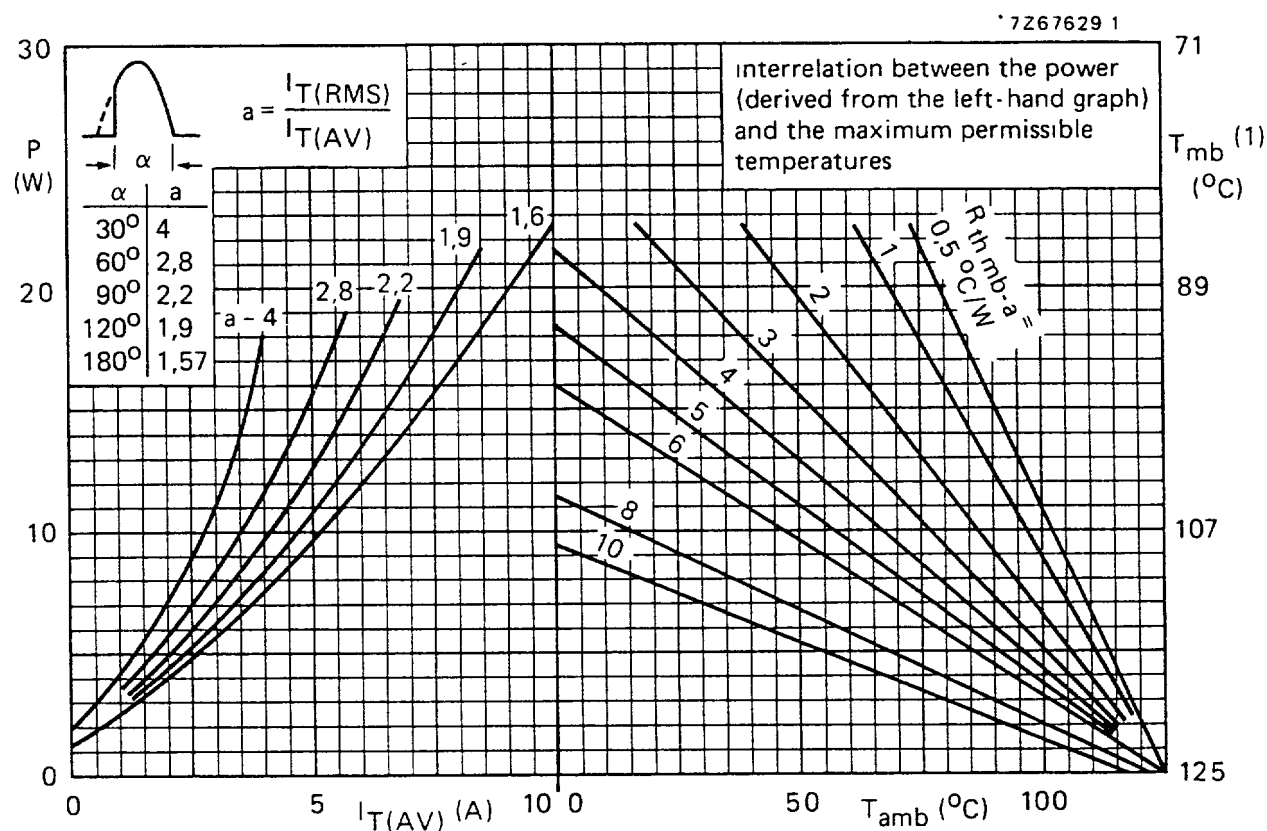


Fig. 3 (1)  $T_{mb}$ -scale is for comparison purposes only and is correct only for  $R_{th\ mb-a} \leq 6$  °C/W.

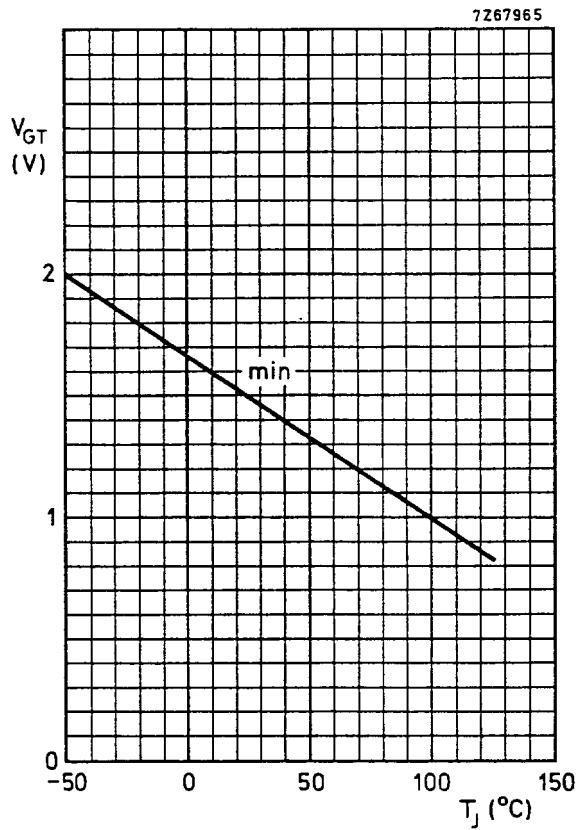


Fig. 6 Minimum gate voltage that will trigger all devices as a function of  $T_j$ .

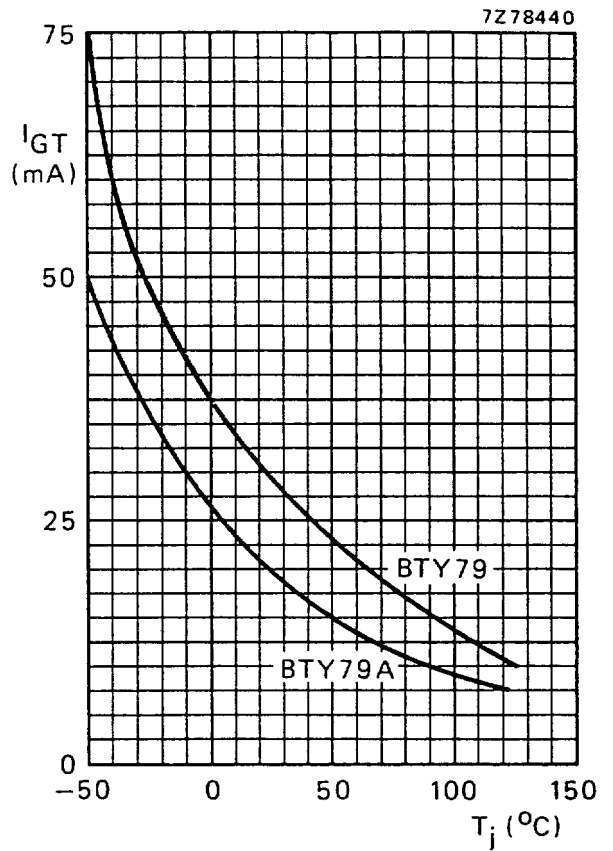


Fig. 7 Minimum gate current that will trigger all devices as a function of  $T_j$ .

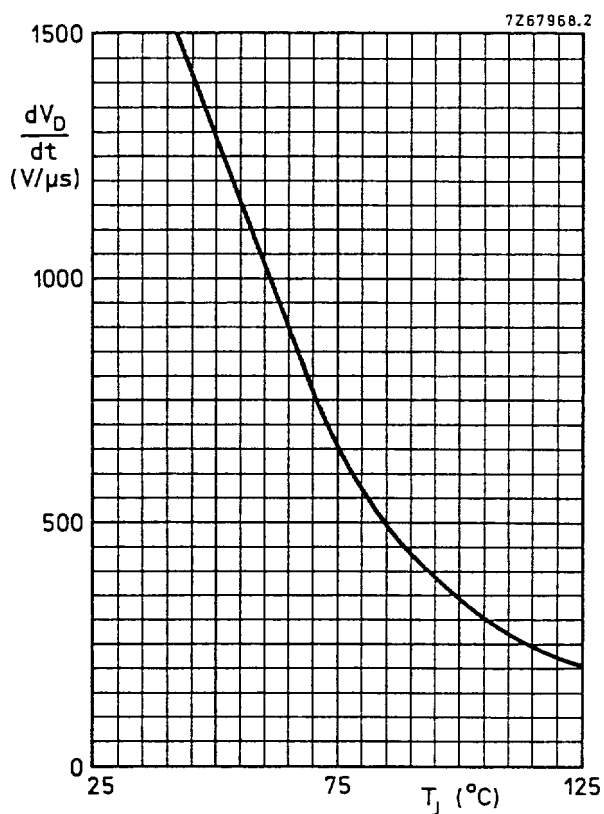


Fig. 8 Maximum rate of rise of off-state voltage that will not trigger any device (exponential method) as a function of  $T_J$ .

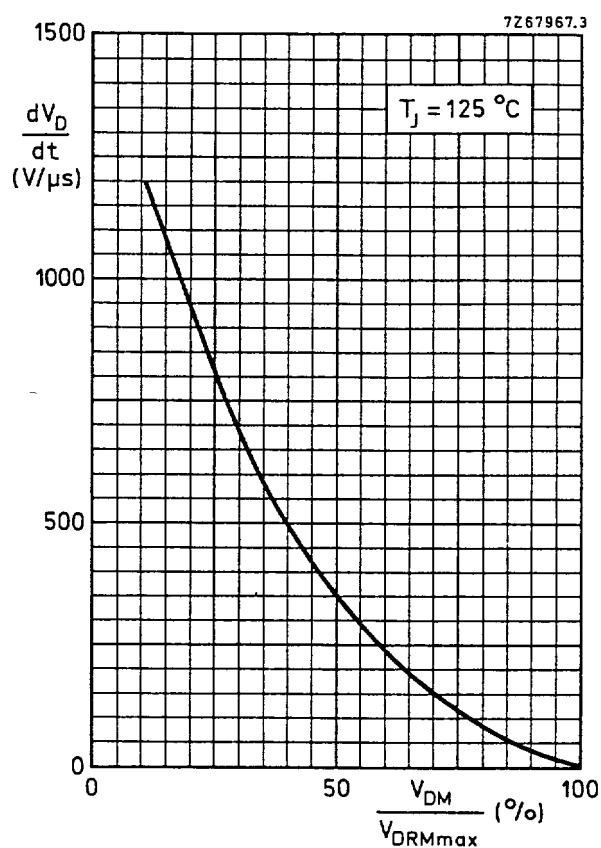


Fig. 9 Maximum rate of rise of off-state voltage that will not trigger any device (exponential method) as a function of applied voltage.

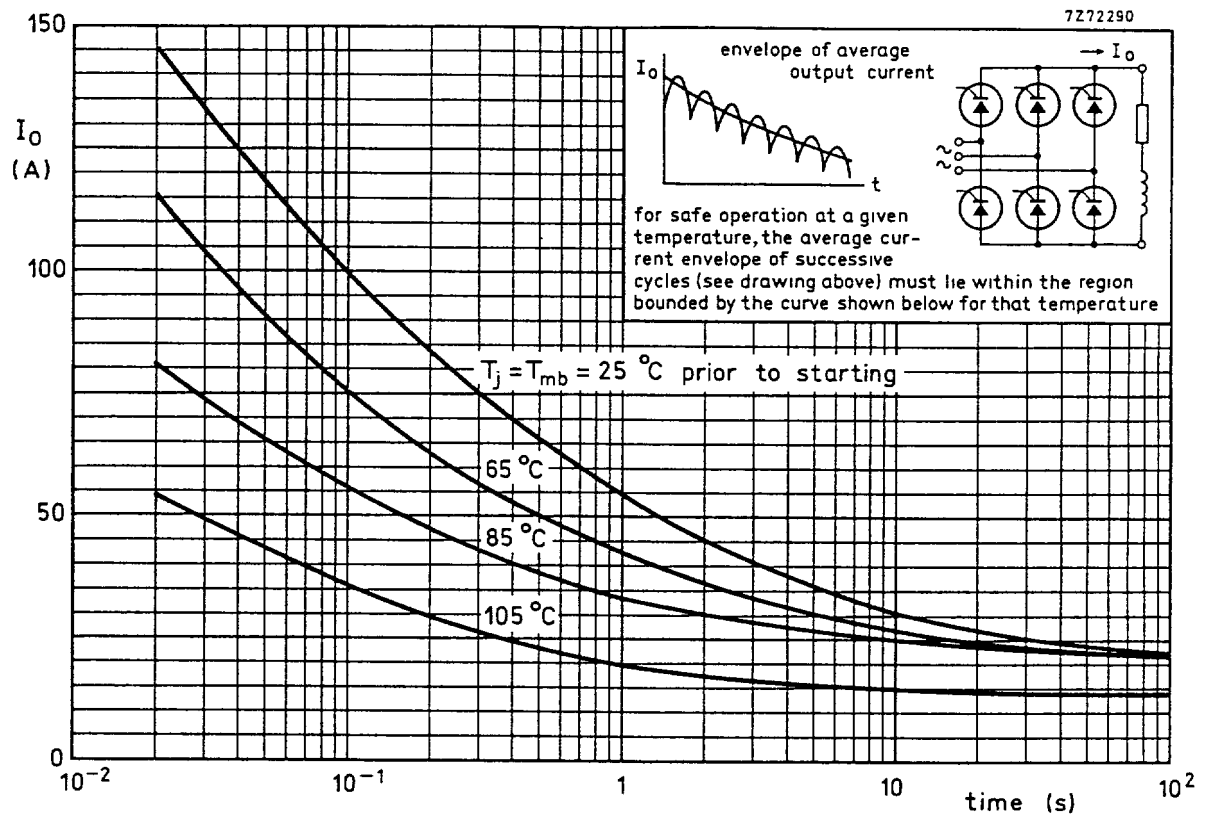


Fig. 11 Limits for starting or inrush currents.

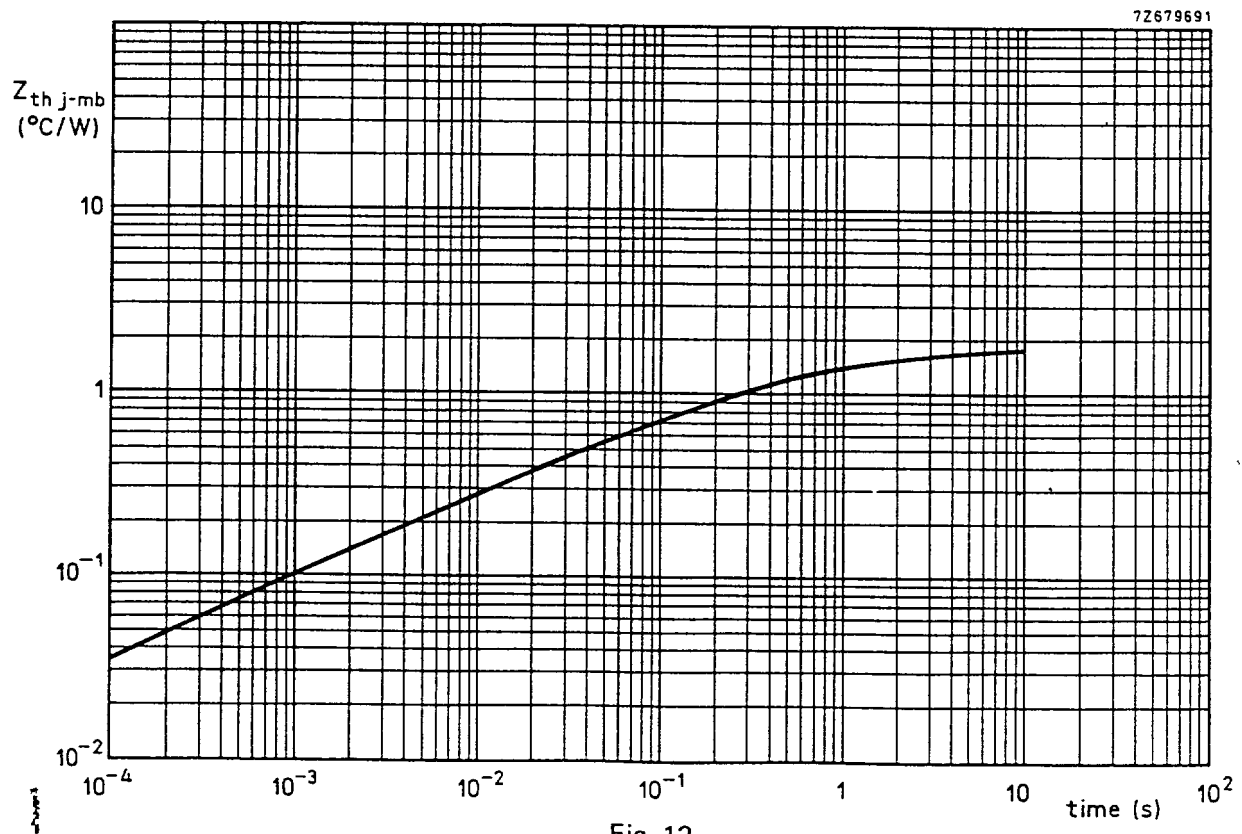


Fig. 12.

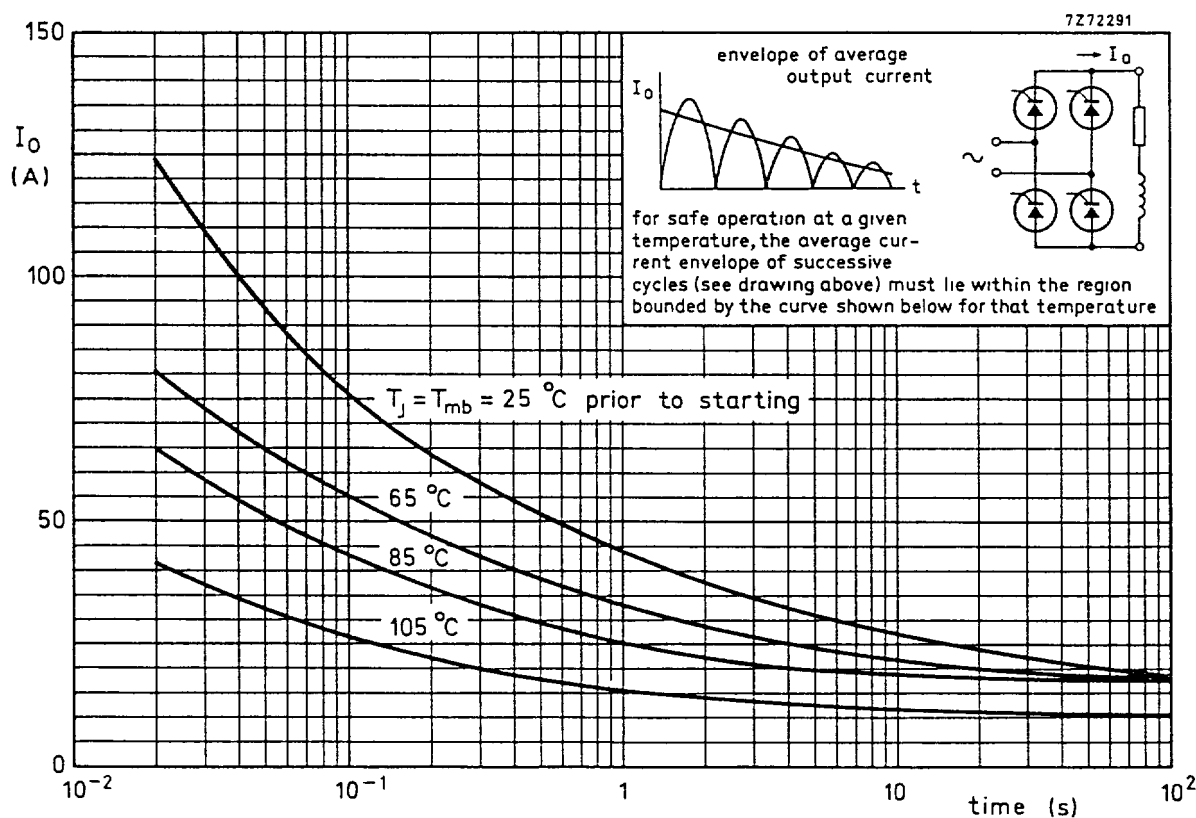
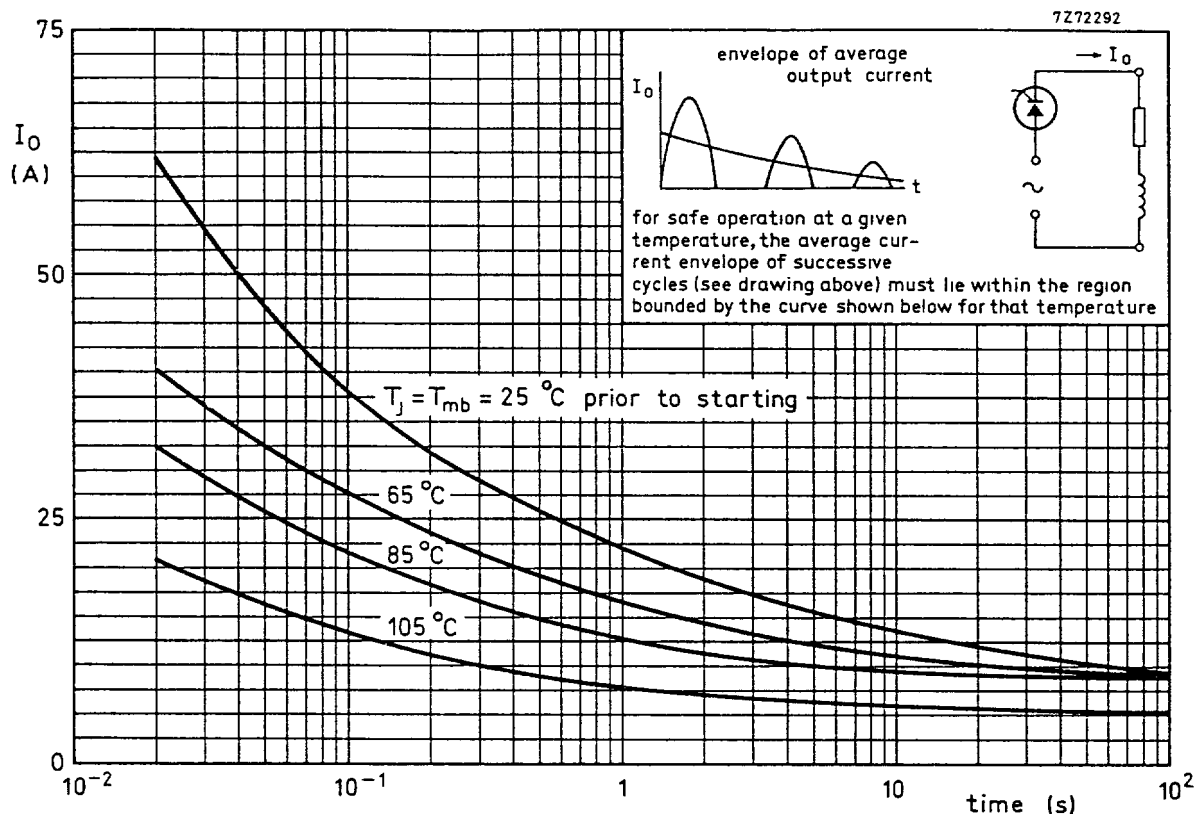


Fig. 10 Limits for starting or inrush currents.